

AMENDMENTS TO THE CLAIMS

Claims 1-3. (Cancelled).

Claim 4. (Previously amended). A PLI frequency synthesizer according to claim 12, further comprising a buffer amplifier for protecting the voltage-controlled oscillator from an abrupt variation at a load portion of the PLI frequency synthesizer.

Claims 5-10. (Cancelled).

Claim 11. (Currently amended). A PLL frequency synthesizer which outputs a signal having a desired frequency, comprising:

a voltage-controlled oscillator (VCO) for generating an output signal ~~having and a frequency;~~ as a function of a control voltage and a power supply voltage;

a phase comparator for comparing a phase of the frequency of the VCO ~~generated output signal-~~ output signal with a phase of a frequency of a reference signal and outputting a difference signal as a function thereof; and

a charge pump for producing ~~an output signal-~~ the control voltage in response to the difference signal ~~output from the phase comparator and for driving the VCO,~~ wherein the control voltage of the output signal from the charge pump is being maintained within predetermined ~~driving limits,~~ limits; and

wherein when the ~~charge pump output signal-~~ control voltage changes to a value close to one of the ~~driving limits thereof,~~ both the output signal from the charge pump and a the power supply signal independent of the charge pump and having a voltage which cancels the change in the charge pump output signal voltage are inputted to the VCO, ~~thereby maintaining-~~ voltage is modified independently of the control voltage so as to maintain the stability of the output signal from the VCO.

Claim 12. (Currently amended). A PLL frequency synthesizer which outputs a signal having a set frequency, comprising:

a voltage-controlled oscillator (VCO) for generating an output signal having a voltage and a frequency as a function of a control signal and a power supply signal;

a phase comparator for comparing a phase ~~of the frequency of the VCO~~ ~~generated output signal~~ with a phase of a frequency of a reference signal and outputting a difference signal in response to; and

a charge pump for producing ~~an output~~ the control signal in response to the difference signal, wherein the ~~output from the phase comparator~~;

~~wherein the VCO is driven by the output signal from the charge pump and a power supply signal is independent of the charge pump and having a voltage controlled based on the set frequency;~~ control signal to thereby widen an apparent lock range of the PLL.

Claim 13. (Currently amended). A radio communication apparatus comprising a PLL frequency synthesizer which outputs a signal having a desired frequency, the PLL frequency synthesizer including:

a voltage-controlled oscillator (VCO) for generating an output signal having a voltage and a frequency as a function of a control voltage and a power supply voltage;

a phase comparator for comparing a phase of the ~~frequency of the VCO~~ ~~generated output signal~~ with a phase of a frequency of a reference signal and outputting a difference signal as a function thereof; and

a charge pump for producing ~~an output signal~~ the control voltage in response to the difference signal ~~output from the phase comparator and for driving the VCO~~, wherein the control voltage of the output signal from the charge pump is being bound within predetermined ~~driving limits~~, limits; and

wherein when the ~~charge pump output signal~~ control voltage changes to a value close to one of the limits, thereof, ~~both the output signal from the charge pump and a~~ and the power supply signal independent of the charge pump and having a voltage which cancels the change in the charge pump output signal voltage are inputted to the VCO, thereby maintaining voltage is modified independently of the control voltage so as to maintain the stability of the output signal from the VCO.

Claim 14. (Currently amended). A radio communication apparatus comprising a PLL frequency synthesizer which outputs a signal having a set frequency, the PLL frequency synthesizer including:

a voltage-controlled oscillator (VCO) for generating an output signal having voltage and a frequency as a function of a control signal and a power supply signal;

a phase comparator for comparing a phase of the frequency of the VCO generated output signal with a phase of a frequency of a reference signal and outputting a difference signal as a function thereof; and

a charge pump for producing ~~an output~~ the control signal in response to the difference signal ~~output from the phase comparator~~,

wherein the VCO ~~is driven by the output signal from the charge pump and a power supply signal~~ is independent of the charge pump and having a voltage controlled based on the set frequency, control signal to thereby widen an apparent lock range of the PLL.

Claim 15. (Previously presented). The radio communication apparatus of claim 14, wherein the PLI frequency synthesizer further includes a buffer amplifier for protecting the voltage-controlled oscillator from the an abrupt variation at a load portion of the PLI frequency synthesizer.